SAVEETHA SCHOOL OF ENGINEERING

CAPSTONE PROJECT

Design a Network topology suitable for the size and layout of the Police Station.

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COURSE NAME: Computer Network for IOT

INTRODUCTION:

The police station's network infrastructure is designed to support secure and efficient communication between various departments and the control room. By implementing a network divided into different sections, we aim to ensure secure access to resources for the administration, investigations, control room, and public relations departments. The network also accommodates real-time communication tools, secure data sharing, and surveillance management.

This project focuses on using Cisco Packet Tracer to design and simulate a network infrastructure for the police station that is scalable, secure, and reliable. Each department is treated as a separate network with distinct IP ranges to ensure proper segregation and control.

Objective:

- Design a network infrastructure for different sections of a police station.
- Implement proper IP addressing, subnetting, and routing between departments.
- Configure a DNS and web server for internal services and communication.
- Test communication and data flow using the ping command.
- Showcase basic HTTP services through a simple web page for internal use.

LITERATURE REVIEW

Modern police networks require robust, scalable solutions that facilitate secure communication and data sharing between various sections. A structured approach to network segmentation, along with proper security protocols, is essential for preventing unauthorized access to sensitive data.

Dynamic routing protocols, like RIP, are often employed in law enforcement to ensure that communication pathways are efficient and adaptable to changes in the network. This is complemented by DNS and HTTP services, which are crucial for managing internal web services, communication, and real-time data transfer.

Security challenges such as unauthorized access to sensitive databases can be mitigated through the implementation of firewalls and encryption protocols. Segmentation of the network further enhances security by isolating the departments, thus ensuring that each section has restricted access to relevant information only.

METHODOLOGY

Network Components:

The network setup involves four key sections in the police station, each acting as its own network:

1. Administration Section
2. Control Room
3. Investigations
4. Public Relations

The network is composed of:

- 1 Router (to route traffic between sections)
- 4 Switches (for intra-departmental communication)
- 6 PCs (allocated to each section for personnel)
- 1 Server (to host DNS and HTTP services)

IP Address Allocation:

Each section in the police station is assigned a unique subnet to differentiate traffic and simplify network management. The details of IP allocation are as follows:

Device	IP Address	Subnet Mask	Default Gateway	DNS Server
PC0	192.168.2.3	255.255.255.0	192.168.2.1	192.168.1.100
PC1	192.168.2.2	255.255.255.0	192.168.2.1	192.168.1.100
PC2	192.168.3.3	255.255.255.0	192.168.3.1	192.168.1.100
PC3	192.168.3.2	255.255.255.0	192.168.3.1	192.168.1.100
PC4	192.168.4.3	255.255.255.0	192.168.4.1	192.168.1.100
PC5	192.168.4.2	255.255.255.0	192.168.4.1	192.168.1.100
Server	192.168.1.100	255.255.255.0	192.168.1.1	192.168.1.100

Router Configuration:

The router connects all four networks and routes traffic between them. Here is the configuration for the router:

Interface	IP Address	Subnet Mask
FastEthernet0/0	192.168.2.1	255.255.255.0
FastEthernet0/1	192.168.3.1	255.255.255.0
FastEthernet1/0	192.168.1.1	255.255.255.0
FastEthernet1/1	192.168.4.1	255.255.255.0

This ensures that each department (network) is routed properly, allowing inter-departmental communication.

DNS and Web Services Configuration:

The server in the network is configured to run both **DNS** and **HTTP** services:

1. **DNS Configuration**:
   - Domain Name: `www.policestation.com`
   - IP Address: `192.168.1.100`
   - The DNS service will resolve this domain to the internal server.
2. **HTTP and HTTPS**:
   - HTTP services are turned on, and a basic webpage is hosted, displaying the message "Welcome to the Police Station Network."
   - Personnel can access this page using the domain name configured in the DNS.

Testing and Validation:

After setting up the network:

- Use the **ping command** to check connectivity between PCs in different networks.
- Use a web browser on any PC to access `www.policestation.com`, ensuring the server responds with the correct webpage.

RESULT:

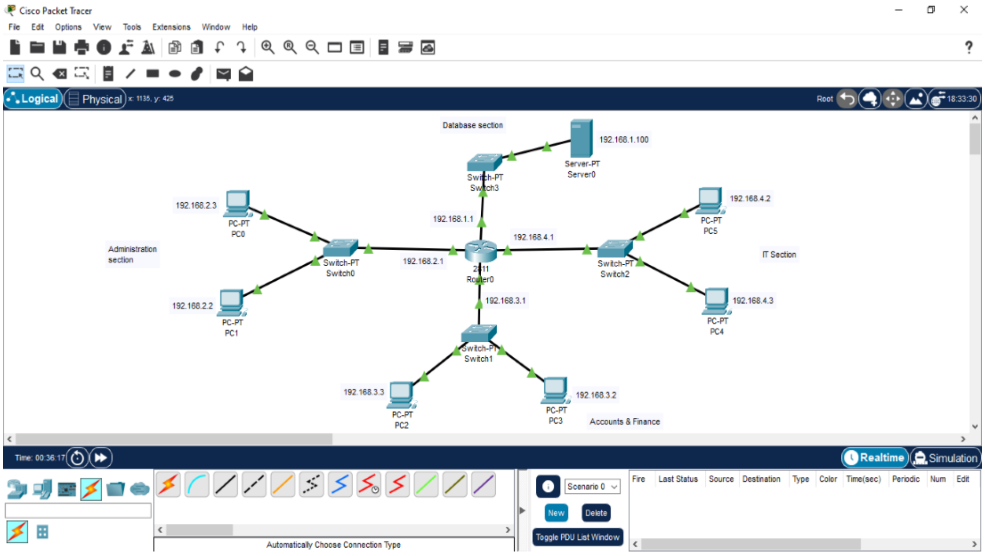
The network designed in **Cisco Packet Tracer** successfully allows inter-departmental communication and resource sharing while maintaining security and flexibility. The routing setup ensures each department can communicate with the others while maintaining its own subnet.

- **Ping Test Results**: All PCs can successfully ping each other across different subnets, ensuring network connectivity.
- **Web Services**: Users are able to access the web page hosted on the internal server by entering the domain name in their browser.

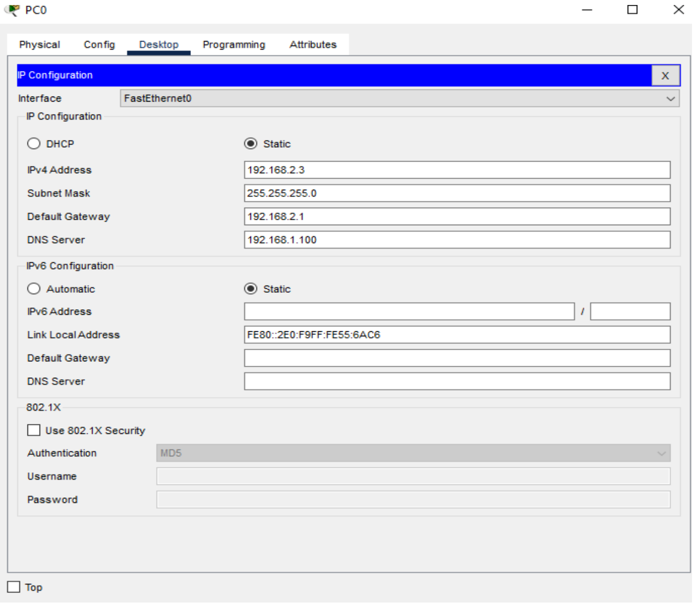
This design ensures:

1. Proper IP allocation and routing for different departments.
2. Successful configuration of DNS and HTTP services for internal use.
3. Connectivity between PCs and secure access to shared resources (server).

Network Design:



For example, For PC0:



Interface: FastEthernet0

IP Configuration

○ DHCP ● Static

IPv4 Address: 192.168.2.3

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.2.1

DNS Server: 192.168.1.100

IPv6 Configuration

○ Automatic ● Static

IPv6 Address: /

Link Local Address: FE80::2E0:F9FF:FE55:6AC6

Default Gateway:

DNS Server:

802.1X

□ Use 802.1X Security

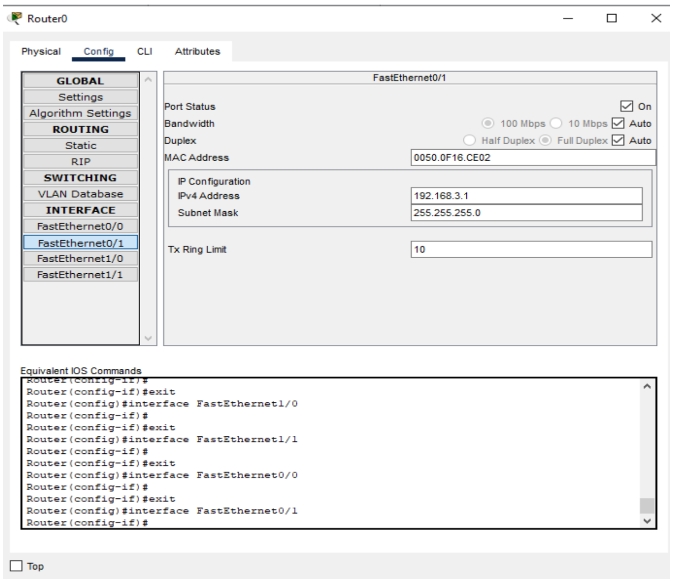
Authentication: MD5

Username:

Password:

□ Top

For example, For FastEthernet0/1:



FastEthernet0/1

Port Status ☑ On
Bandwidth ● 100 Mbps ○ 10 Mbps ☑ Auto
Duplex ○ Half Duplex ● Full Duplex ☑ Auto
MAC Address 0050.0F16.CE02

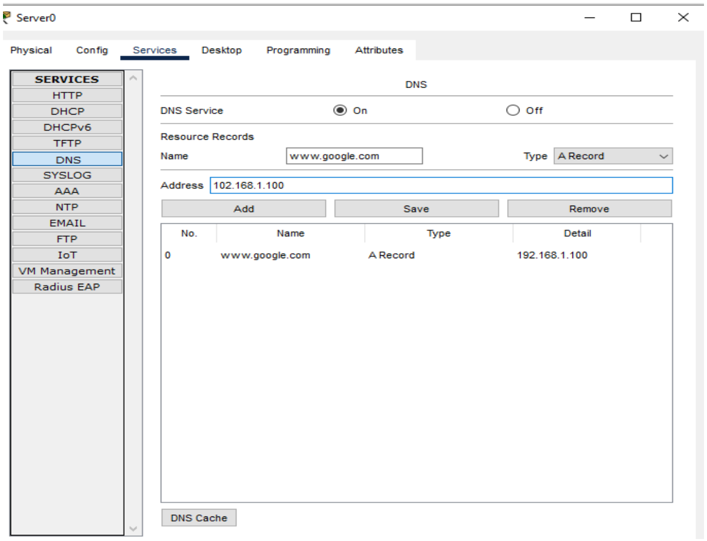
IP Configuration
IPv4 Address 192.168.3.1
Subnet Mask 255.255.255.0

Tx Ring Limit 10

Equivalent IOS Commands

```
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet1/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet1/1
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/1
Router(config-if)#
```

For Server DNS:



DNS

DNS Service ● On ○ Off

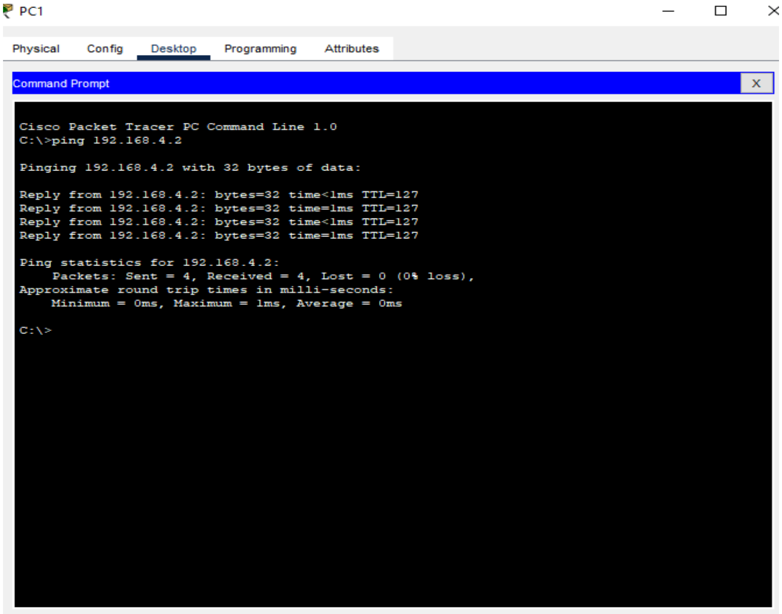
Resource Records

Name www.google.com Type A Record

Address 102.168.1.100

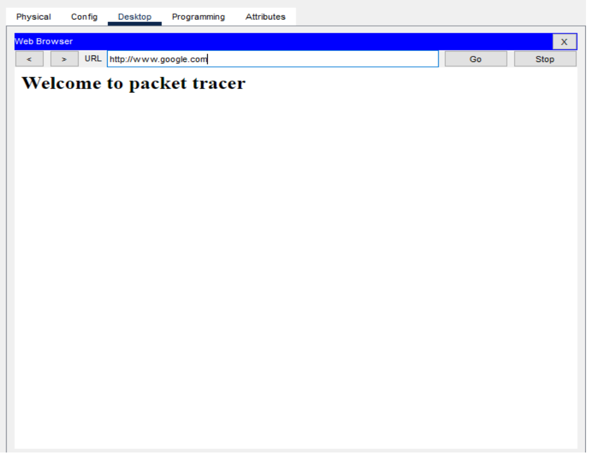
No.	Name	Type	Detail
0	www.google.com	A Record	192.168.1.100

For PC1,Command Prompt:



```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.4.2

Pinging 192.168.4.2 with 32 bytes of data:

Reply from 192.168.4.2: bytes=32 time<1ms TTL=127
Reply from 192.168.4.2: bytes=32 time=1ms TTL=127
Reply from 192.168.4.2: bytes=32 time<1ms TTL=127
Reply from 192.168.4.2: bytes=32 time=1ms TTL=127

Ping statistics for 192.168.4.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
```

For Web Browser:



http://www.google.com

Welcome to packet tracer

CONCLUSION:

The network designed for the police station fulfills the operational requirements of inter-departmental communication, secure data sharing, and resource management. **Cisco Packet Tracer** provides a reliable environment for simulating the network infrastructure, which can be scaled for real-world implementation.

This network ensures:

1. **Segmentation**: Each department is allocated its own network, making it easier to manage and secure.
2. **Routing**: Dynamic routing allows for smooth communication between departments.
3. **Web Services**: The internal server provides DNS and HTTP services, ensuring accessibility to internal resources.

Future expansions may include additional security measures like **firewall** configurations, **VPN services** for remote access, and **surveillance integration**.